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(54) Abstract Title

Method and control system, for stopping a motor vehicle, detects vehicle motion and maintains power to vehicle systems if vehicle is moving

(57) In a method and control system described, the vehicle speed is examined when an ignition starter switch is switched off thus turning off the driving motor of the vehicle and the power supply of a speed transmitter which provides a vehicle speed signal is maintained at least so long until the vehicle comes to a standstill. Power supply may also be maintained to an electronic steering lock and the ignition key may be prevented from being removed.

FIG. 2

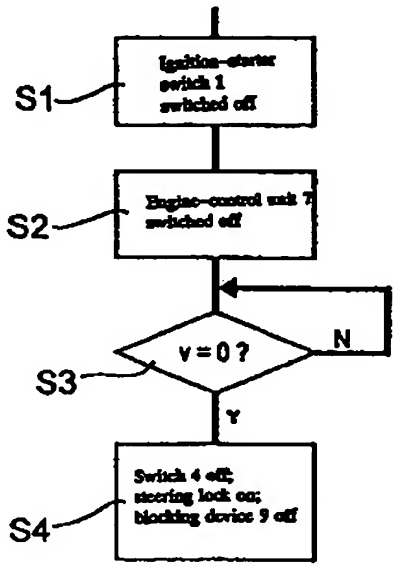

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FIG. 1

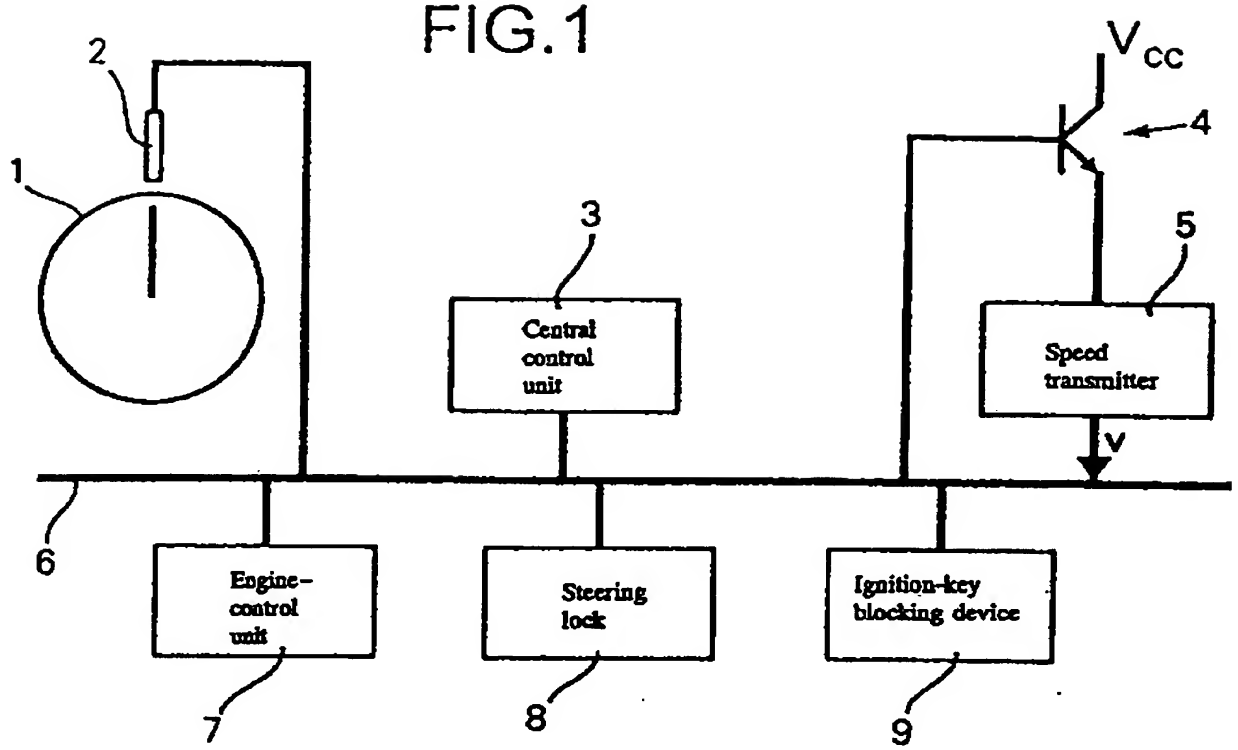
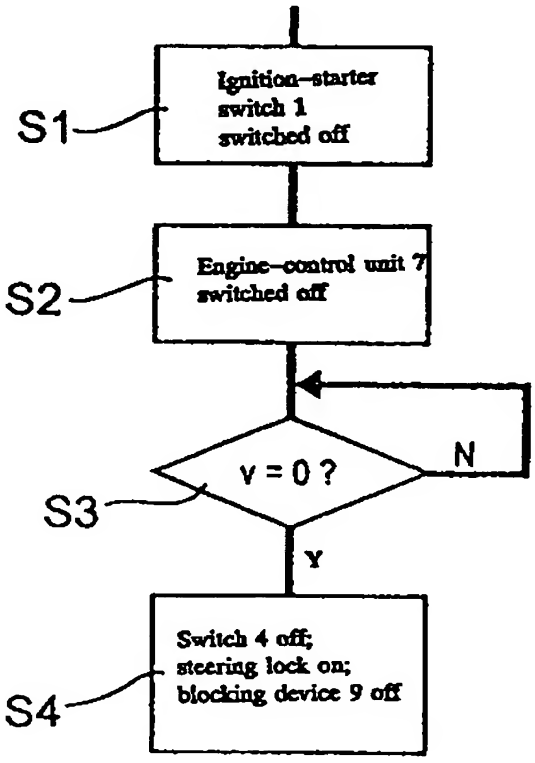


FIG. 2



Method and control system for stopping a motor vehicle

The invention relates to a method for stopping a motor vehicle and to a motor-vehicle control system.

Generally, in the case of conventional ignition-starter switches, the power supply of the individual terminals of the ignition lock connected to the loads and/or control units is switched directly by turning the ignition key into corresponding turning positions. For the purpose of stopping the motor vehicle, the ignition key is turned into the initial position so that the driving motor is shut off and in addition the power supply of a major part of the loads and control units is turned off. In this position, the ignition key can then be removed from the ignition-starter switch. In the case of purely electronic ignition-starter switches, on the other hand, the individual key positions are detected in a contact-free manner, for example with the aid of Hall sensors. The power supply to the individual terminals or directly to the corresponding loads and/or control units can then be switched by means of corresponding semiconductor switches, or corresponding bus information can be transmitted by way of the bus system (for example "CAN"-bus) to the central control unit. When the ignition key is turned into the on position, the battery voltage is switched to the corresponding loads and/or control units, usually by way of the terminal 15 (switched to positive downstream of the battery; output of the ignition-starter switch). If the ignition key in the case of such conventional mechanical or electronic ignition-starter switches is turned from the on position, that is, the position corresponding to that in which power is supplied to the loads (terminal 15), in the direction of the zero

position, that is, to the initial position, usually the power supply of the hitherto active control units and/or loads is turned off. When the power is turned off in this way, the speed transmitter, which up until now has been measuring the travelling speed of the motor vehicle, is deactivated so that a vehicle-speed signal is no longer available.

An electronic ignition-starter lock system for a motor vehicle, in which the ignition key when inserted into the ignition-starter lock exchanges a coded operating signal with the latter, is described in DE 44 34 587 A1. An electromagnetic blocking device, which prevents the ignition key from being turned, is only deactivated when the coded operating signal is accepted as being correct. In the case of the known ignition lock system, a steering wheel lock is provided that is not locked until the ignition key is removed from the ignition-starter switch.

The invention aims is to provide a method for stopping a motor vehicle that is distinguished by an increased level of operating safety.

According to a first aspect of the invention there is provided a method for stopping a motor vehicle, including the steps of generating a speed signal in a speed transmitter which represents the vehicle speed, turning off the motor-vehicle driving motor when an ignition-starter switch is switched off, examining the vehicle speed when the ignition-starter switch is switched off and maintaining the power supply of the speed transmitter at least until the vehicle speed signal indicates that the vehicle has come to a standstill.

According to a second aspect of the invention there is provided a motor-vehicle control system comprising a speed transmitter for generating a speed signal, representing the vehicle speed, an ignition-

starter switch, which when switched off causes the motor-vehicle driving motor to be turned off, at least one control unit for controlling functions of the motor vehicle, and a power-supply switch controlling the power to the speed transmitter, independently of a switching-off process of the ignition-starter switch, for maintaining the power supply of the speed transmitter even after the ignition-starter switch has been turned off.

In the case of the method according to the invention, the speed signal is used to detect whether the vehicle is still moving when the ignition-starter switch is switched off. This movement of the vehicle can be caused, for example, by the vehicle coasting or, when parking on a slope, by gravity acceleration of the vehicle given insufficient braking. In this case, the power continues to be supplied to the speed transmitter despite the fact that the ignition-starter switch has been switched off so that a speed signal is still made available. This speed signal can be used to block activation of the steering lock, in particular of an electronic steering lock, and/or the removal of the ignition key until the speed signal indicates that the vehicle has come to a standstill.

The speed signal, which is still made available despite the fact that the ignition has been switched off, can also be evaluated additionally or alternatively by means of other control units, for example safety systems, such as airbag systems or belt-tightening systems, which in this case are then likewise still supplied with power at least until the vehicle speed has died away to zero after the ignition-starter switch has been switched off. The speed signal or else even another signal, for example a switching signal which is generated by the central control unit after the vehicle has come to a stop, for example the

power-off signal for the speed transmitter and/or the activation signal for the steering lock or the block-deactivation signal which deactivates the ignition-key blocking device and thus makes it possible to take the ignition key out of the ignition-starter switch, can be used directly in this connection as a parameter which signals that the vehicle has stopped.

By means of the invention it is thus possible both in the case of electronic and in the case of conventional ignition-starter switches, to deactivate a steering lock, in particular an electronic steering lock, even after the ignition-starter switch has been switched off, until the vehicle wheels are stationary. A situation can thereby be avoided where the steering lock is applied when the vehicle is still rolling and the vehicle can thus no longer be steered and may for example roll against an obstacle, such as a wall. Alternatively or additionally, the invention permits the ignition key to be removed only when the wheels are stationary. Thus the ignition key is always in such a position, when the vehicle is still rolling, that by simply turning the ignition key the driving motor and/or other components, such as, for example, the servo-steering system, can be rapidly re-activated.

In the case of the invention therefore, when the ignition key is turned into the off position, the driving motor is shut off immediately, this preferably being controlled, in the case of the preferably electronically designed ignition-starter switch, by means of a central control unit establishing that the ignition-starter switch has been switched off and by way of the bus of said control unit. However, the control unit, at least when it establishes that the speed signal is signalling a travelling motion of the motor vehicle that is still continuing, keeps the speed transmitter and, if applicable, further units in the

switched-on state by means of corresponding coding or programming. The standard tachometer or even another control unit that generates a speed signal, for example the ABS-control unit, can be used as a speed transmitter. Only once it is detected that the vehicle has come to a standstill are the remaining units turned off, which until then have still been kept active. They may preferably be turned off by the central control unit by way of the bus, in which case at the same time, or even in a staggered manner with respect to time, the electronic steering lock is brought in and the ignition-key block is cleared, that is, the ignition key can be removed.

In the case of the method and control system according to the invention, the speed signal can thus be generated and evaluated further even after the ignition-starter switch has been turned off (with the vehicle still rolling), without any additional outlay or an increase in costs resulting hereby. The operation of the motor vehicle by the driver remains unchanged.

For a better understanding, embodiments of the invention will now be described, purely by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows an embodiment of the motor vehicle control system according to the invention, and

Figure 2 shows an embodiment of a program routine for the control of the stoppage of the motor vehicle.

Figure 1 diagrammatically shows the structure of a motor vehicle control system in accordance with the invention for controlling the stoppage of the motor vehicle that is equipped with an ignition-starter switch 1, in particular an electronically designed

ignition-starter switch. A sensor 2 operating in a contact-free manner detects the zero position of the ignition-starter switch 1 that permits the ignition key to be inserted and removed and is linked by way of a line to a bus 6 to which a control unit 3 is connected. The control unit 3 is preferably designed as a central control unit, yet can also be provided by a control unit which is present in the motor vehicle for a special control function. The control unit 3 receives a signal v, by way of the bus 6, which signal is generated by a speed transmitter 5 and which represents the current travelling speed of the motor vehicle, and, as a function of the magnitude of this signal v and other parameters, such as, for example, the position of the ignition-starter switch 1, controls an engine-control unit 7, an electronic steering lock 8 and a blocking device 9, which can block the removal of the ignition key. The blocking device 9 is controlled by means of the central control unit 3 in such a way that it is only possible to remove the ignition key from the ignition-starter switch 1, even if the latter is in the zero position, when the travelling speed of the motor vehicle, represented by the signal v, has dropped to zero.

The power supply of the speed transmitter 5 is switched on and off by a switching element 4 which, for its part, is controlled, by way of the bus 6, by the central control unit 3 so that the power supply of the speed transmitter 5, even if the ignition-starter switch is switched into the zero position, is not turned off until the signal v, which is generated by the speed transmitter 5, indicates to the central control unit 3 that the vehicle has come to a standstill. Thus, the speed signal v continues to be available even after the ignition-starter switch has been switched off when the vehicle is still rolling and

can be evaluated by the central control unit for the control of the electronic steering lock 8, the blocking device 9 and/or further components - not shown - of safety systems, for example.

The blocking device 9 can be formed, for example, by an electromagnetic blocking device which is arranged in the ignition lock, that is, in the ignition-starter switch, and contains, for example, an electromagnetically actuated blocking catch which when the ignition key is inserted engages into a recess of the same or engages behind a projection provided on the ignition key and only enables the latter to be removed from the ignition-starter switch 1 again when it is switched over into an inactive position by the central control unit 3.

An embodiment of a program routine, which is stored in the central control unit 3, for controlling the stopping of the motor vehicle is shown in Figure 2.

If the central control unit 3, by way of the sensor 2, detects that the ignition-starter switch 1 has been switched off (Step 1), that is, detects that said switch has been turned to the zero position enabling the removal of the key, by way of the bus 6 it transmits a command to the engine-control unit 7 instructing it to shut off the driving motor (Step S2). Furthermore, the central control unit 3 with the aid of the signal v examines whether the travelling speed of the motor vehicle is equal to zero or not (Step S3). If this examination reveals that the vehicle is still moving, the speed transmitter 5 remains activated, that is, the switch 4 continues to be kept in the switched-on state. The vehicle speed v is monitored by the control unit 3 in a loop for so long until it has dropped to zero, that is, the vehicle has come to a standstill. Only when this is the case, that is, when the result is "yes" in Step S3, is the switch 4

switched off in Step S4, that is, the speed transmitter 5 is turned off, and the blocking device 9 is deactivated. As a result, the ignition key can now be removed. Furthermore, the electronic steering lock 8 is activated so that the steering lock locks. If applicable, further control units or other components which have been kept active up until now can also be deactivated. The vehicle is then stopped.

Claims

1. A method for stopping a motor vehicle, including the steps of generating a speed signal in a speed transmitter which represents the vehicle speed, turning off the motor-vehicle driving motor when an ignition-starter switch is switched off, examining the vehicle speed when the ignition-starter switch is switched off and maintaining the power supply of the speed transmitter at least until the vehicle speed signal indicates that the vehicle has come to a standstill.

2. A method according to claim 1, for stopping a motor vehicle having a steering lock, wherein after the ignition-starter switch has been switched off, a parameter signalling that the vehicle has come to a standstill is examined and the steering lock is only activated if it is identified that the vehicle has come to a standstill.

3. A method according to claim 1 or 2, wherein the ignition-starter switch is provided with a blocking device which is actuated in such a way that it only enables the ignition key to be removed when a parameter, which has been examined for the purpose of identifying movement of the motor vehicle, signals that the motor vehicle has come to a standstill.

4. A method according to claim 2 or 3, wherein the parameter signalling that the vehicle has come to a standstill is the speed signal or a control signal which controls the cut-off of the power supply of the speed transmitter.

5. A motor-vehicle control system comprising

a speed transmitter for generating a speed signal, representing the vehicle speed,

an ignition-starter switch, which when switched off causes the motor-vehicle driving motor to be turned

off,

at least one control unit for controlling functions of the motor vehicle,

and a power-supply switch controlling the power to the speed transmitter, independently of a switching-off process of the ignition-starter switch, for maintaining the power supply of the speed transmitter even after the ignition-starter switch has been turned off.

6. A control system according to claim 5, further comprising a control circuit arrangement which switches off the said power-supply switch when both the ignition-starter switch is switched off and the speed signal indicates that the vehicle has come to a standstill.

7. A control system according to claim 5 or 6, further comprising a steering lock controlled in such a way that it only causes the steering to be locked when the speed signal indicates that the vehicle has come to a standstill.

8. A control system according to claim 7 wherein the steering lock is an electronic steering lock.

9. A control system according to any of claims 5 to 8, further comprising a blocking device for blocking the removal of the ignition key, which blocking device is arranged in such a way that it only enables the ignition key to be removed from the ignition-starter switch when the speed signal indicates that the vehicle has come to a standstill.

10. A control system according to any of claims 5 to 9, further comprising a central control unit which, by way of a bus, is electrically connected to the ignition-starter switch, the speed transmitter, the power-supply switch, an engine-control unit and, if applicable, an electronic steering lock and a blocking device for blocking the removal of the ignition key.

11. A method for stopping a motor vehicle

substantially as herein described with reference to the accompanying drawings.

12. A control system for stopping a motor vehicle substantially as herein described with reference to the accompanying drawings.